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PORTLAND STATE UNIVERSITY

Maseeh College of Engineering and Computer Science



Department of Engineering and Technology Management

ETM 530/630 – Decision Making

Spring 2018

Individual Project

HDM Model to Select Marketing Analyst Job Offer

Alex Tacco-Melendez

1. INTRODUCTION

Times have changed and we no longer pick a career in terms of climbing the corporate ladder or to continue with a “family profession tradition” that will make our parents happy. We now select an occupation based on the satisfaction and fulfillment it will bring to our lives.

Nowadays, people spend significantly more time on the job than in any other single activity, making this a crucial decision that will influence their lifestyles.

Recent graduates and entry-level professionals are not only interested in receiving a fair remuneration at the end of each month, they are also seeking for companies that will offer them challenges, opportunities to make a difference, and learning experiences that will add to their personal and professional development.

The question is how do graduates or professionals entering the job market find employers that are a good fit with their interests and values?

The purpose of this paper is to examine which criteria represent a higher significance for decision makers when they have the task of selecting an organization to work for that will allow them to apply all their skills while being aligned with their personal and professional values.

2. RESEARCH OBJECTIVE

The main objective of this project is to assist students and professionals in their decision of selecting a Marketing Analyst position offer from three prestigious organizations located in the Portland area.

This will be accomplished through the implementation and optimization of a decision-making model using the Hierarchical Decision Model (HDM) framework discussed throughout the course.

The research also aims to analyze the decision-making process which includes assessment from a panel of experts carefully selected based on their knowledge and experience on the field of study.

3. METHODOLOGY

The decision-making model that has been implemented in this study was based on the theory of the Hierarchical Decision Model (HDM) which was developed by Professor Dundar F. Kocaoglu in 1979.

The hierarchical decision model is a multi-criteria methodology that helps us analyze complex problems through a hierarchical structure. The approach is based on utilizing a pairwise comparison scale and a judgmental quantification technique by a panel of experts in the field of study (Kocaoglu, 1988).

The complexity of the decision problem will determine the number of hierarchical levels which will be analyzed independently. Each level of the hierarchy will have its own decision elements, which at the same time are related to ones included in the level above and below it, each one should be carefully evaluated in terms of finding a solution to the overall decision problem.

It is highly important for these criteria to be increasingly atomic moving down the hierarchy, independent at each layer, exhaustive at each branch of the hierarchy, and contribute meaningfully towards the ultimate decision (Dr. Neshati, 2018).

The potential alternatives are placed in the last level of the hierarchy; and all of the decision factors will be evaluated for each of the possible outcomes to identify the best alternative that meets all the requirements.

The panel of experts that will be providing their judgement on all the criteria will implement a pairwise comparison technique which helps them focus on truly identifying the contribution of each attribute to the decision problem. To determine the robustness of the model, we confirm if the inconsistency and disagreement values are below the 10% threshold.

In general, the HDM is an effective tool that assists decision-makers in breaking down a complex problem into more digestible tasks to synthesize large amounts of information and draw conclusions that will help us elucidate the decision problem.

4. DATA SOURCES

4.1 Experts

Regardless of the nature of the task, complex decision-making is rarely left to the responsibility of one person and there is usually an assumption made that “two heads think better than one”. The organizational requirements of collecting, analyzing, refining and validating critical information can be a long and arduous process (Clayton, 2006).

Eight experts were chosen to assess the decision-making model based on their high knowledge and expertise. Three of the experts belong to each of the companies that form part of the decision-making outcomes. Each of them has worked several years in their respective organizations and could provide very useful information to include in the model.

The other five experts were college students and young professionals who are seeking to develop a successful career at a company where they feel they would make a good fit based on their skills and values.

4.2 Criteria

A comprehensive description of each attribute was provided to the panel of experts so they could complete an effective evaluation process of all the decision elements conforming each level.

4.2.1. Location

a) Commute Time: Prospect theory suggests that value is assessed with respect to gains or losses; in regards to commuting time, the experience value for a given urban commute is expectedly subject to diminishing sensitivity of the total travel duration (Yuen-wah, 2003). In other words, the longer the commuting time, the lower its marginal value. Thus, this is an important factor to consider when accepting a job offer since a pleasant commuting experience can cause a positive psychological effect that will translate into a positive mindset throughout the day.

b) Accessibility: There are various modes of transportation to get from our house to our workplace on a daily basis. If we are fortunate enough to own a car, we will probably not face

any issues in reaching our destination. However, most people do not have cars and they need to commute to work using bikes, or some sort of public transportation. Luckily, the Portland area has excellent bike lanes as well as an efficient system of bus lines and trains for people to get from point A to B. Nevertheless, there are a few issues with public transportation. For instance, I previously worked for a local company that was located within 5 miles from my house; the distance was not a problem, but there were no bus lines available near my neighborhood until 6h00 (my shift went from 5h00 to 13h30).

c) Surrounding Facilities: This factor considers the conveniences or amenities that are located near the work place. We spend many hours a week in our jobs; therefore, it is important to optimize our spare time and count with nearby services that will suit our needs. For instance, a person might need to go through the grocery store after he gets off work or he/she might need to make a deposit at the bank for his student loan. The urban development within a corporate area is a significant element that many people look for when selection a job.

4.2.2. Compensation

a) Annual Income: Nowadays, more and more companies are introducing individual, variable, and performance-related pay. As a result, salaries in particular have risen dramatically in the last few years (Frey, 2002). The total cash compensation for an employee is usually comprised of a yearly base pay and bonuses.

b) Economic Benefits: Employees are not only compensated through attractive salaries; some companies offer other economic benefits such as stock option plans which not only increase their

employees' annual income but also their commitment to the organization. Other benefits include medical insurance, dental insurance, 401(k), paid vacations, etc.

c) Non-Tangible Benefits: Outside of the economic package stated previously, some companies offer benefits that do not represent an inflow of cash for employees and are sometimes more valuable to people than mere money. These incentives can include work-life-balance, health/wellness focus, job satisfaction, schedule flexibility, among others.

4.2.3. Organization

a) Corporate Culture: Not only does culture reside within us as individuals, but it is also the force that drives most of our behavior both inside and outside organizations. We are members of a country, an occupation, an organization, a community, a family, and a social group. Each of these cultures is part of us and impacts us (Schein, 2009). In the context of corporate culture, it is crucial for us as individuals to feel identified and aligned with the values and practices of the organization that we intend to work for.

b) Decentralized Structure: This type of system is present when power is dispersed among many individuals. It allows organizations to respond more quickly to different types of challenges that arise in a dynamic and globalized setting. This type of structure allows our voices to be heard and our decisions to be taken into consideration. It is difficult for only one person to make all of the decisions that an organization needs to achieve its goals, the “many are smarter than the few” (Dr. Neshati, 2018).

c) Social Responsibility: Companies consist of more than just economic relations, facts and figures. They are not soulless entities but are full of subjectivity, abstraction, puzzles, invention, and unpredictability (Zimmerli, 2007). Nowadays, successful organizations do not only rely on the professional skills and talents of its members, but they also take into account social and moral issues. A social responsible company is not one that promotes ecological event once a year, it is an organization which makes every day decision with integrity and thinking about how their actions will produce repercussions on future generations. We want our children to have the same opportunities and live in the same type of world that we lived in.

4.2.4. Career Development

a) Growth Opportunities: Career growth opportunities represent a critical benefit to the employees of an organization. When these employees believe that their firm provides career development options, they reciprocate with stronger commitment which leads to lower turnover intentions (Parker, 2013). It is important for a company to identify the talent that their collaborators develop throughout their journey at the organization to expose them to challenges that will help them fulfill their professional and personal needs.

b) Training Programs: many employees feel motivated when their organizations invest time and money in enhancing their skills and knowledge. Some of these training courses are mandatory since employees need to be up to date in procedures and technology implementations to perform their tasks. However, other companies also provide additional courses, which allow employees to obtain skills that will help them improve their performance or even search new areas of development.

c) External Education Support: It is important for organizations to support their employees when they wish to expand their knowledge and pursue academic programs to fulfill this need. Some companies will cover the tuition expenses since they know it is a significant investment that will also benefit the organization.

4.3 Alternatives

1. Nike: Nike is an American multinational corporation that is engaged in the design, development, manufacturing, and worldwide marketing and sales of footwear, apparel, equipment, accessories, and services. The company is headquartered near Beaverton, Oregon, in the Portland metropolitan area. It is the world's largest supplier of athletic shoes and apparel and a major manufacturer of sports (Nike, 2018).

2. Intel: Intel Corporation is an American multinational corporation and technology company headquartered in Santa Clara, California, in the Silicon Valley. Intel supplies processors for computer system manufacturers such as Apple, Lenovo, HP, and Dell. Intel's Oregon operations cover four campuses west of Portland in Washington County and is Intel's largest concentration of facilities and talent in the world. With a site population of approximately 20,000 at the end of 2017, Intel is Oregon's largest private employer (Intel, 2018).

3. Kaiser Permanente: Kaiser Permanente is an American integrated managed care consortium, based in Oakland, California, United States. It is recognized as one of America's leading health care providers and not-for-profit health plans. Medical services in Oregon and Washington are provided by the Northwest Permanente medical group. The region is unusual in that it provides a dental program and has a medical services research center (Kaiser, 2018).

5. MODEL DEVELOPMENT

The model that has been implemented to address the decision-making problem described at the beginning of the paper has four layers. The first layer contains the decision objective; in this case, we want to be able to select the best Marketing Analyst job offer from a pool of companies that have showed interest in hiring us. The second layer of the model defines the perspectives which help us break down the decision-making problem. In this study, the four perspectives are Location, Compensation, Organization, and Career Development. We need to go into a little more detail about how each of these factors can help us elucidate the problem; therefore, we create the third layer in model which contains the sub-criteria for each perspective. For the purposes of this paper, the sub-criteria that have been determined to help us analyze the decision problem are Commute Time, Accessibility, and Surrounding Facilities for Location; Annual Income, Economic Benefits, and Non-Tangible Benefits for Compensation; Corporate Culture, Decentralized Structure, and Social Responsibility for Organization; and Growth Opportunities, Training Programs, and External Support Education for Career Development. Finally, the fourth and last layer of our model contains the alternatives that will help us solve our decision-making problem; in this case, we will select a marketing analyst job offered by three successful local companies: Nike, Intel, and Kaiser Permanente.

Figure 1 illustrates the HDM model with its four levels described above.

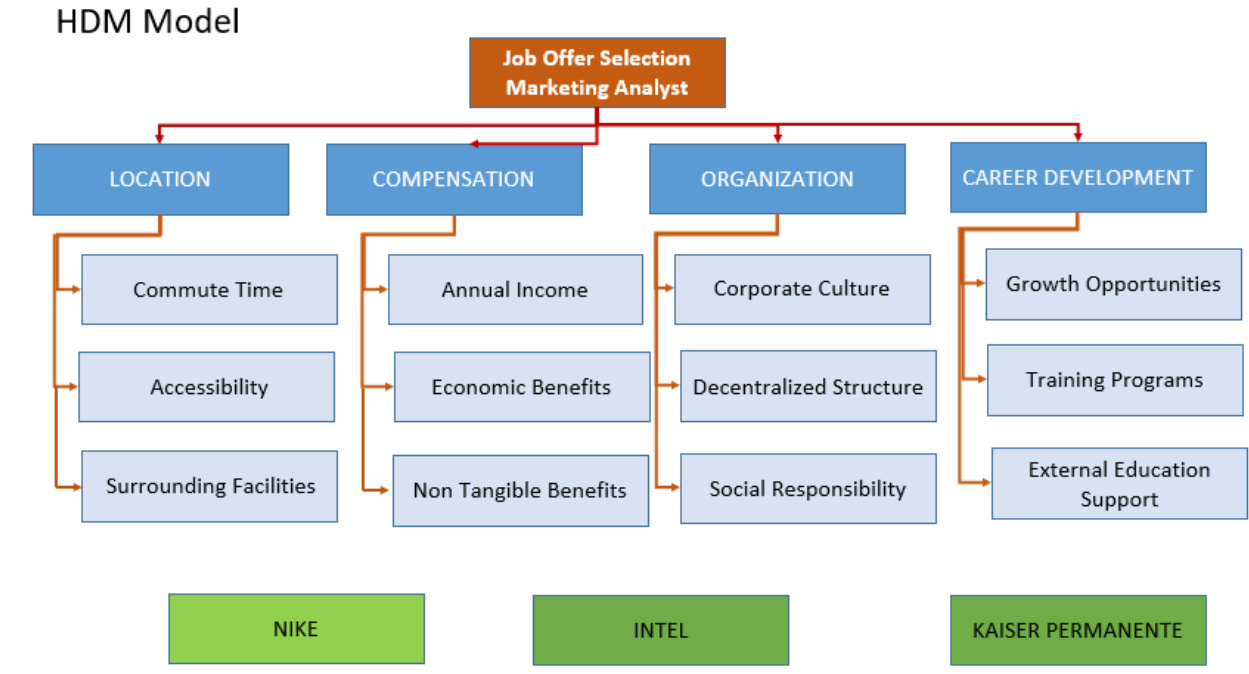


Figure 1. Hierarchical Decision Model

6. MODEL EVALUATION AND DATA COLLECTION

The group of experts was carefully chosen due to their background and expertise in the subject in matter; nevertheless, they were provided with documents that contained instructions on how to assess the model as well as a brief explanation on each of the criteria and sub-criteria involved in the decision-making problem. They received the link to access the HDM tool and provide their evaluations on the criteria, sub-criteria, and alternatives through a pairwise comparison approach.

Figure 2 illustrates the HDM model that was created through the tool provided in the course.

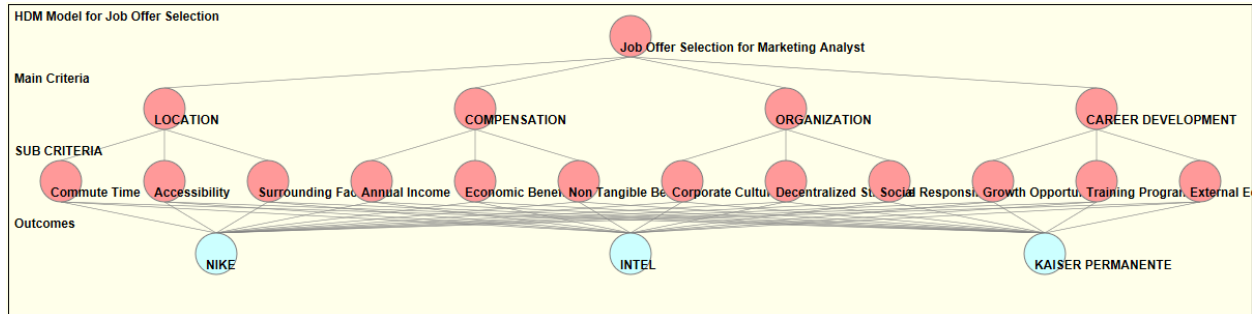


Figure 2. Hierarchical Decision Model Tool

7. KEY FINDINGS AND ANALYSIS

After the completion of the assessment process performed by the panel of experts, the data was retrieved and the results were analyzed.

Conclusions will be described for each level of the model.

Level 2: At this layer, the perspective that showed to be the most important by the experts' judgement is Career Development with a mean of 0.42. It is important to notice that there is a significant difference between the first option and the rest of the results at this level. Therefore, this criterion becomes a decisive factor for a person when deciding to accept a job offer.

	EXPERT1	EXPERT2	EXPERT3	EXPERT4	EXPERT5	EXPERT6	EXPERT7	EXPERT8	AVERAGE
LOCATION	0.07	0.11	0.11	0.08	0.13	0.1	0.09	0.43	0.14
COMPENSATION	0.26	0.18	0.18	0.14	0.34	0.34	0.16	0.09	0.21
ORGANIZATION	0.16	0.27	0.25	0.24	0.27	0.25	0.27	0.09	0.23
CAREER DEVELOPMENT	0.51	0.43	0.46	0.54	0.26	0.31	0.48	0.39	0.42
Inconsistency	0.08	0	0.04	0.01	0	0	0.03	0.17	0.04

Level 3: At this level, Growth Opportunities is the most important sub-criteria selected by the experts with a mean value of 0.56. Note how this sub-criterion belongs to the Career Development perspective which was the highest of its kind at the second level. It is important to point out that Annual Income and Commute Time also show high values, 0.51 and 0.44, respectively. Interestingly, these factors belong to other two perspectives. This is a significant finding since it demonstrates that the model is robust and most of the elements evaluated were considered relevant.

	EXPERT1	EXPERT2	EXPERT3	EXPERT4	EXPERT5	EXPERT6	EXPERT7	EXPERT8	AVERAGE
Commute Time	0.13	0.31	0.44	0.47	0.23	0.67	0.55	0.68	0.44
Accessibility	0.35	0.48	0.45	0.31	0.41	0.15	0.13	0.28	0.32
Surrounding	0.52	0.21	0.11	0.22	0.35	0.19	0.31	0.04	0.24
Annual Income	0.6	0.48	0.41	0.47	0.39	0.5	0.58	0.61	0.51
Economic	0.28	0.31	0.4	0.33	0.32	0.39	0.27	0.08	0.30
Non Tangible	0.12	0.21	0.2	0.19	0.29	0.11	0.16	0.31	0.20
Corporate	0.12	0.48	0.2	0.35	0.4	0.15	0.26	0.05	0.25
Decentralized Structure	0.59	0.31	0.08	0.42	0.35	0.57	0.15	0.23	0.34
Social	0.29	0.21	0.72	0.23	0.25	0.28	0.59	0.71	0.41
Growth Opportunities	0.62	0.48	0.57	0.51	0.47	0.6	0.56	0.68	0.56
Training	0.26	0.31	0.22	0.2	0.21	0.22	0.14	0.24	0.23
External Education	0.11	0.21	0.21	0.29	0.32	0.18	0.31	0.08	0.21
Inconsistency	0.02	0.00	0.07	0.01	0.02	0.02	0.02	0.05	0.03

Level 4: At the last level, Intel shows 0.42 which is the highest value among the three alternatives. This means that Intel is the preferred company to work at according to the experts' evaluation of the different decision factors.

Job Offer Selection for Marketing Analyst	NIKE	INTEL	KAISER PERMANENTE	Inconsistency
EXPERT1	0.61	0.27	0.12	0.04
EXPERT2	0.39	0.33	0.28	0
EXPERT3	0.26	0.49	0.25	0.02
EXPERT4	0.33	0.45	0.22	0
EXPERT5	0.19	0.47	0.34	0
EXPERT6	0.63	0.18	0.19	0
EXPERT7	0.28	0.48	0.25	0.01
EXPERT8	0.18	0.72	0.1	0.06
Mean	0.36	0.42	0.22	
Minimum	0.18	0.18	0.1	
Maximum	0.63	0.72	0.34	
Std. Deviation	0.16	0.15	0.08	
Disagreement				0.118

Inconsistency and Disagreement: the results of the individual judgments were consistent at every level. This means that each expert met the 10% inconsistency threshold when performing a pairwise comparison between all the criterion of the model.

In regards to disagreement, the model showed a value of 0.118 which exceeds the 10% threshold. However, this is not a bad result. As we can see in the previous chart, four experts obtain a value of zero for inconsistency and other experts obtain values of up to 4% and 6%. The gap between these percentages is fairly high which gives us a higher than desired disagreement level.

Source of Variation	Sum of Square	Deg. of freedom	Mean Square	F-test value
Between Subjects:	0.18	2	0.088	2.73
Between Conditions:	0	7	0	
Residual:	0.45	14	0.032	
Total:	0.63	23		
Critical F-value with degrees of freedom 2 & 14 at 0.01 level:				6.51
Critical F-value with degrees of freedom 2 & 14 at 0.025 level:				4.86
Critical F-value with degrees of freedom 2 & 14 at 0.05 level:				3.74
Critical F-value with degrees of freedom 2 & 14 at 0.1 level:				2.73

The F-test value for the model is 2.73. If I use a 90% confidence level, I could say that the results obtained by the model are statistically significant since $2.73 \geq 2.73$. However, at the 95% confidence level, the results are not quite as significant as before: $2.73 \leq 3.74$.

8. CONCLUSION

The decision of a Marketing Analyst job offer is focused on graduate students and entry-level professionals who are entering the job market and have a difficult time deciding on what company to work for. Three of the most important companies in the Portland area were considered as alternatives for the decision-making problem; they each belong to a different industry and offer a unique set of elements that are valued differently by each person.

The Hierarchical Decision Model was implemented with the help of expert assessment to identify and measure the significance of each attribute in the decision problem.

Intel was selected as the number one alternative for a candidate to accept the job offer based on the experts' evaluation of the criteria and sub-criteria. Career Development was valued as the highest decision factor within the second level, and Growth Opportunities was the highest attribute within the third level. Interestingly, this sub-criteria belongs to Career Development (category parent) which indicates that the model is robust and there is consistency among the experts evaluations.

The model proved to be trustworthy since its results met the inconsistency and disagreement standards with values of less than 10% and 12%, respectively.

9. FUTURE RESEARCH

After acknowledging the results of the study, it would be interesting to zoom in the fourth perspective (Career Development) and conduct a new research objective implementing the HDM model. Once done this, we could work with organizations to try to create career plans that would attract the best talent in benefit of overall growth.

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